

A NEW ALPHA-OMEGA MAP FOR ACQUISITION TEST AND EVALUATION

 **George Axiotis**

Department of Defense Acquisition Test and Evaluation (T&E) has remained the gatekeeper to Major Defense Acquisition Program production since its formalization over 25 years ago. Under T&E's oversight, the types, methods, and sources for warfighting systems have significantly evolved to meet/counter the nation's security challenges. The DoD has studied and recommended actions to accelerate Acquisition Reform for decades, while only "tweaking at the margins" for T&E. Now is the time for DoD to consider a new approach to T&E, steering away from the "buy" decision to the more relevant "acceptance" and "operational" domains. This article outlines the issues and proposes a new "Alpha-Omega" map for T&E that charts the way ahead for how DoD actually procures its weapon systems.

Keywords: *Test & Evaluation, Development Testing, Operational Testing, Acquisition Reform, Alpha-Omega Model*



Test and Evaluation

The new Alpha-Omega approach!



Department of Defense (DoD) leaders and numerous reform studies criticize the department's acquisition process for its inability to control spiraling costs and delays in getting systems to the user. In response, *Acquisition Reform* efforts to date focus on better requirements, efficient resources planning, as well as increasing feedback and accountability (DoD, 2004a, pp. 2-7). DoD Acquisition Test and Evaluation (T&E), comprising the formal processes, policies, personnel, equipment, facilities, and consumables necessary to develop, certify, test, and evaluate defense systems for production, has faced much of this criticism. In response, T&E reform focuses on process streamlining, reducing overhead, and further integration within the engineering process to better support the "buy" decision.

Background

The defense acquisition process, using T&E as a gatekeeper, is relatively unchanged since the Packard Commission recommendations (DoD, 1986a; DoD, 1986b, p. 11). Yet, the methods and players of DoD acquisition have fundamentally changed. Just as the Pentagon is embracing a new map for the application of military power based on an active strategy for the world as it is today, DoD needs a similar active strategy for determining who is best served by T&E (Barnett, 2004).

This article examines the fundamental influences on Acquisition T&E, the results of major studies to date on reforming Acquisition T&E, and concludes that the current emphasis on "buying" as the *raison d'être*s for T&E must be replaced with a new two-tiered framework and leadership that better supports both contractual necessity and operations in the field. A new world of defense systems acquisition is emerging, driving the need for a new map for T&E based on acceptance and operation, which I suggest is the *Alpha* and *Omega* of a new T&E order.

GOOD INTENTIONS

Acquisition T&E follows a linear engineering approach to reduce risk, building insight to meet contract delivery, assessing the delivered configuration in operational environments, verifying that the system works, and certifying that the system warrants further procurement (DoD, 2008a, pt. 1, p. 12, & encl 6, pp. 51-53). Acquisition T&E is Service- and system-centric, managed through dedicated funding and contract vehicles with both *Development Testing* (DT) and *Operational Testing* (OT) supporting the "buy" decision. Public Law delays the decision beyond initial production until a submission of a report following OT:

The Secretary of Defense shall provide that a major defense acquisition program may not proceed beyond low-rate initial

production until initial operational test and evaluation of the program is completed. (Operational, 2009).

Yet for all its formality, T&E plays a weak role in controlling what the department actually buys. The current DoD acquisition policy allows initiation of low-rate initial production (LRIP) just after Critical Design Review. What test results are available supports this decision, but completion of testing or successful results are not formal prerequisites.

Note that DoD has no “Approval for Service Use” decision based on successful test results. The only legal hurdles to proceeding beyond LRIP are to 1) submit a report to Congress based on an OT, and 2) seek approval of the test plan in advance from the Director, Operational Test and Evaluation (DOT&E) (Operational, 2009). Again, as with LRIP, there is no requirement to pass the test, only to conduct it. Acquisition T&E today operates within a “buy” construct that neither demands minimal user-oriented testing before beginning the production process, nor formalizes the full commitment to production through successful completion of testing.

EMPHASIS ON SPEED

DoD Acquisition Reform since the mid-1990s emphasizes faster cycle times through efficient management, capitalizing on emergent technologies, fielding of early capabilities, and continuous product evolutionary cycles. The objective is to maintain competitive edge by getting to the “buy” decision faster. Yet, in World War II compelling need put emphasis on production, with T&E supporting it. Production changes, additional requirements, and performance shortfalls based on experience in the field were the foundations for block upgrades (Gropman, 1997, pp. 11, 41, 44, 100, 115). Over 60 years later, the Mine Resistant Ambush Protected vehicle procurement mimics this approach with an emphasis on T&E supporting production (GAO, 2008, pp. 8–9).

DoD works to balance procurement for both a longer term, near-peer threat, as well as near-continuous engagement against a less defined extremist threat (Chao, 2009). Senior leaders struggle with the current acquisition construct, and if given the choice would favor one that responds better to ill-defined threats, requirements that grow and change rapidly, and technologies that evolve many times within the development cycle (Testimony, 2009). Today, as in WWII, the focus is getting the right capability to the field faster, but speed-to-user is not enough to drive significant change in the current T&E process.

A NEW ENVIRONMENT—REALLY

DoD systems development and acquisition have undergone profound change in recent years, brought about by industry practice and government

policy that sets the new environment for T&E (Defense Science Board, 2008, pp. 6, 16). The following discussion provides an illustrative snapshot of the systems development and acquisition process:

REQUIREMENTS PROCESS

Requirements have steered away from the primacy of technocrats, planners, and buyers to the current end-user (DoD, 2004a, pp. 2-7). Component Commanders present unique challenges as they focus on near-term needs, have different visions for how requirements are met, and have diverse views on how advanced technology can be used. These users are less concerned with technology nuances, industrial influences, and specific capabilities. Yet, to manage successful acquisition, specificity is critical for configuration design and engineering.

SYSTEMS DEVELOPMENT

Systems are more complex, and the ability to characterize fully end-state performance before fielding is a challenge. Lead Systems Integrators (LSI) have increasingly less insight into the subsystems they are integrating and thus less confidence in understanding, and certifying to, actual systems-of-systems performance. The burden increasingly falls back to the department for resolution, accompanied by risks not just from increasingly complex systems-of-systems integration with differing maturity, but also the globalization of defense industrial capability.

INDUSTRIAL BASE

The consolidation of the Defense Industrial Base through the 1990s has left DoD with fewer options for competitive development of major capital systems. This drives systems to take on inherent design, engineering, production, and management practices, with less government insight. Key components and materials will increasingly be available only from foreign sources, inevitably leading to less control of the design and engineering (Guay, 2007, pp. 66-67). The emphasis shifts from pre-production to as-delivered product adequacy.

MISMATCHED ACQUISITION STRATEGIES

The Department of Defense Instruction (DoDI) 5000.02 relies on technologies being wrung out before initiating development, competitive prototyping used to find the “best of breed,” and due diligence through T&E before production. Yet, technology evolves too quickly to tie acquisitions to fixed baselines, with initial units differing in performance and utility

from those later on in production. LSIs today deliver systems comprised of subsystems in various levels of maturity and product life cycles.

NON-SERVICE-UNIQUE SYSTEMS

In spite of the rhetoric, DoD does not buy capability—it buys “things” (systems) that are married to others, and along with end users (warfighters) form warfighting capabilities. While DoD is procuring more “joint” systems than ever before, the vast majority are still Service-centric, expected to operate in ever increasingly joint environments (DoD, 2004b, pp. 8, 12-14). It has become more difficult to characterize one system’s adequacy for its own acquisition decision without interdependent systems that in and of themselves are of varying maturity levels.

NETWORKED OPERATIONS

National Defense Strategy reflects ever increasing multi-Service and Coalition operations (DoD, 2008b, p. 17). These self-forming operations preclude fully understanding interfacing systems performance or a Concept of Operations (CONOPS) to support an adequate OT in advance of a fielding decision. While the department’s *Testing in a Joint Environment Roadmap* of 2004 set a vector to lash together the disparate testing capabilities within the department and industry, it can only go so far given ever-changing configuration baselines and unpredictable alterations of netted combat systems (DoD, 2008b, pp. 8, 18). Testing and subsequent evaluations will focus more on in-theater assessments.

EXPANDED ACQUISITION AUTHORITY

Once the domain of major commands, acquisition authority has spread to user- and mission-centric organizations such as Missile Defense Agency and Special Operations Command, each with its own processes. As such, systems developers will have less confidence in their system’s performance as they have less insight into, or control of, interfacing systems. T&E will be less likely to depend on a priori knowledge of full system capability and default to rudimentary baseline assessments.

T&E BEYOND THE PROGRAM MANAGER

System complexity and interconnectivity mean that testers will find it difficult to build test scenarios that characterize all desired performance points within shorter development timeframes. Added to the difficulty is a less well defined threat or understanding of future CONOPS as each user

will likely tailor operations to their own needs. Acquisition will increasingly rely on tests outside the program manager's control to build just enough insight for the decision needed. Capitalizing on other data from which to build consensus is key to leveraging integrated T&E methodologies of the revised DoD 5000.02 (DoD, 2004a; DoD, 2005, p. 5; Defense Science Board, 2008).

SERVICES ARE OVERSIGHT

Service T&E has undergone massive consolidation since the mid-1990s, a situation that cannot readily be reversed in the short term. Since 2000, the Army consolidated much of its T&E organization and reduced its workforce between half and two-thirds. The Navy reduced personnel and substantially integrated its prime contractor/government testing. The Air Force further shifted DT control to prime contractors with commensurate reductions in its workforce (Defense Science Board, 2008, pp. 4-5). The burden of conducting traditional Service DT has fallen ever more frequently onto the contractors as part of the product acceptance process.

The above shows that not only how the department acquires its systems has changed, but that most cannot be addressed without fundamental change in T&E. Much of what exists in today's "new" methodologies to help nudge the acquisition process along in this new environment ignores the acquisition and T&E world as it exists today. The current processes quickly succumb under the weight of the endless reviews and forums.

NO REAL CHANGE

DoD conducted three comprehensive studies on weapons systems acquisition, with emphasis on T&E, including the Defense Acquisition Performance Assessment (DoD, 2005), the Defense Science Board Task Force on Developmental Test and Evaluation (Defense Science Board, 2008), and the Joint Defense Capabilities Study (DoD, 2004a). These authoritative studies produced a myriad of recommendations for T&E and acquisition. While each report had its emphasis, their findings and recommendations for T&E were generally similar and grouped into four broad thrusts:

1. Gain organizational efficiencies by blurring the distinction between DT and OT.
2. Push discovery earlier in the process through more rigorous testing up front.
3. Increase transparency and streamline process overhead.

- 4. Better utilize the planning and acquisition processes for joint warfighting needs.

All three studies presented strategies to efficiently push T&E to better support the “buy” decisions through process streamlining and combining DT and OT events, where possible, as part of an integrated T&E framework feeding a continuous thread of discovery. These form the basis of the DoD 5000 integrated T&E strategy. Yet, “integration” is fundamentally “efficiency” of questionable savings since early-on schedule and cost avoidance is lost through later rework and retest.

Unfortunately, none of the three studies reassessed T&E’s role or its customer. While testing is fundamental to systems engineering and contractual compliance, Acquisition T&E is seen as a “speed bump” to procurement. In trying to serve many masters, T&E became costly, less efficient, and its reports of questionable utility to both the buyers and the users.

A FUTURE OF MANY MASTERS

Future Acquisition T&E must support two acquisition extremes—the quick-reaction, less defined threat and the long-term, near-peer threat (DoD, 2008b, pp. 8, 15–17). It must also support near-term contractual necessities as well as longer term product life-cycle processes. The emphasis is early capability delivery for initial fielding. For many complex systems, the department will only begin to understand the intricacies and capabilities of those systems once they are delivered and operating in the field. The Missile Defense Agency recognized this and developed T&E processes to support dedicated knowledge points that now form the basis for the revised DoD 5000 (Statement, 2008).

DOOD MUST BE MORE EFFICIENT AND EFFECTIVE IN GETTING INFORMATION TO THE USER AND FEEDBACK FROM OPERATIONS IN THE FIELD.

As in WWII, we find ourselves with users forward deployed, persistently engaged, and needing 75 percent solutions in months. DoD must be more efficient and effective in getting information to the user and feedback from operations in the field.

A New Model

Acquisition T&E must focus on its mission, not function, to support acquisition and system complexity as they are today. T&E must uncover critical risks prior to initiating a program or, once begun, leverage the knowledge of subject matter experts as a trade-off against risk. The focus today is to provide capability as soon as it is ready, with T&E the primary mechanism for fielding the right capability at the right time. This new model proposes capability be separate but affiliated to the buying decision.

While we acquire systems through the buying process, capabilities based on aggregates of constantly evolving systems are also delivered to the user. Authority to initiate development has become the initial production approval point, reflecting the national commitment it is. The acquisition process is no longer the tidy affair it once was. Yet, it is how DoD responds that is the basis for a new T&E model, which shifts emphasis from “buying” to the more relevant product acceptance and operational domains.

AN “ALPHA-OMEGA” MODEL

The new model for T&E shifts the emphasis from buying to two basic but not necessarily sequential domains: The first domain is the world of acceptance tests, or Alpha Tests. Alpha Tests are activities to sufficiently characterize systems in support of contractual necessities, management, and initial fielding decisions. The second domain—Omega Tests—encompasses the operational assessments that follow later, which assess mission and value added over the fielding life cycle.

The vision is a T&E process that accelerates the delivery of initial DoD capability by developers, while ensuring continuous evaluation of performance in the field for current operations and future capability development. This approach supports acquisition and life-cycle activities such as the department’s performance-based logistics and training.

Alpha Tests. Alpha Tests are events necessary to meet contractual requirements by capturing initial baseline capability for Service use. “Alphas” comprise all initial experiments, contractor development tests, quality tests, Service-unique interface and environmental compliance tests, and security and accreditation tests, as well as initial limited user tests. They are the necessary blending of Contractor Tests used to support delivery to the government with the traditional Service-oriented interface testing (DT) later on. Alpha Tests are a continuous aggregate of events, which are not necessarily fully completed events or *pass-fail* by their structure. Alphas are agnostic in their management and not necessarily under any one single agent’s control. Their results form the basis for decision gates, and are ultimately for Service use. Alpha Tests

provide the basis for understanding delivered items at the time of delivery, not necessarily against a priori baseline parameters.

An Alpha Test construct capitalizes on all existing datasets, whether or not contractor-derived, and not throttled by concerns over the color of money, contracts, or ownership. It feeds on other Service efforts, direct and indirect program manager efforts, and training and fielding activities. Alpha fills the bin of system knowledge regardless of source. Further, an Alpha approach provides the program manager and those of affiliated efforts, the freedom to select the appropriate data from which to argue the case for delivery, up to and including the “approval for Service use” (ASU). Where a lack of data exists, the program manager is obligated to fill the void or ensure that others do their share to help build the case for ASU.

An Alpha approach also requires involvement by customers, users, and test and oversight agents for insight and advice, where practical or necessary, given their control over ASU. Less oversight is required during Alpha Test as the burden falls on the program manager to build the case necessary to deliver the incremental capability to the next user or integrator in the chain. This methodology is consistent with that used by sub-tier vendors delivering sub-systems to the LSI and consistent with the department’s *Systems Engineering Guide for Systems of Systems* (DoD, 2008c, pp. 21, 24–25).

Omega Tests. Omega Tests are those scripted and unscripted, supervised and un-supervised, demonstrations of systems operation in the field. Users, OT agents, and oversight, training, logistics, and doctrine agents focus on system utility and are less concerned with the buying decision. Omega Tests capitalize on data and experience in the field, not to pass-fail (since the department has long since committed to the program), but to build on the baseline understanding of capabilities and limitations at ASU. Omega feedback also forms the basis for the next capability increment, or decision to move on to new capabilities. Data and insight, through formal reports, assessments, or observations, are provided to the community at large, including operations research, requirements generators, product life-cycle managers, program/project managers, oversight entities such as Service Chiefs and DOT&E, and training and doctrine agents.

A significant issue, using today’s operational test and evaluation construct, is pegging deficiencies uncovered in complex systems-of-systems tests for a product-centered acquisition process. An Omega strategy broadens the responsibility as Omega Tests are funded through a myriad of single and combined sources, including component commanders; training and doctrine commands; research, logistics, and engineering activities; intelligence agencies; programs; and other Service acquisition agents.

This approach expands the community of Omega agents far beyond that limited by the Service Operational Test Agencies (OTA) and removes the “black hat” image of today’s operational testers. There would be less concern that OTA input blurs the role between system buying and fielding. Nevertheless, U.S.C. Title 10 must be revisited given the requirement to conduct an OT; and for DOT&E, an independent operational assessment must be conducted prior to proceeding beyond LRIP. In all likelihood, DoD will need consensus with Congress to either formalize a supervised period of Alpha testing on basic systems to support independent reporting, or use the first Omega evaluation as the gatekeeper to further cross-Service capabilities. The latter would seem more appropriate as Congress and the DoD get a better picture of capabilities fielded and future needs, with effectiveness judged through a broader evaluation lens.

ORGANIZING TO THE ALPHA AND OMEGA

Service field activities would continue to function as life-cycle agents and as centrally or direct-funded Alpha testers, supporting any Alpha event whether Service-specific or at contractor sites. Alpha, being nonpartisan, can be managed either before formal program initiation, during program phases, or as part of post-production life-cycle support. Much of this structure is already in place, as test personnel at DoD Major Range and Test Facility Base activities are direct customer-funded operations.

Service OTAs, freed from the grip of the acquisition process, support customers of all types. OTA and Omega would be funded through a much broader array of customers less tied to programs. The expeditionary OTA, or other agents tapped for such roles, deploy to theaters of operations or specific test sites to act as user test or evaluation agents. A much smaller senior cadre would be reserved for overseeing Alpha events supporting ASU decisions through working arrangements with program offices. Their portfolio of products and services would be greater than current program-centric assessments. The OTAs would be managed by the Services, overseen by DOT&E, and free to expand their operations worldwide, including foreign systems. This new and expanded role sets the OTA on a path to supporting a wider array of warfighting capabilities.

The emphasis is on empowering with responsibility based on a closer working relationship between the developers and users. The Alpha-Omega strategy relies on three simple rules by which to frame progress and argue for ASU, when appropriate:

1. What warfighting capability is provided (not the “thing” being procured)?
2. To what degree does it work, and how do you know (capabilities/limitations as delivered)?

3. What are the impacts to other systems (risk assessment across the doctrine, organization, training, materiel, leadership and education, personnel, and facilities)?

EMPOWERED TESTERS

Testers and evaluators increase their impact on new program vectors. The emphasis is not on whether systems are good enough to buy (as they are already being bought), but rather what new vector must be set, based on performance and deficiencies observed. OTAs plan, manage, and oversee Omega Tests as well as assess capability in the field, working with the users to vet future capabilities, upgrades, or changes to doctrine and CONOPS. A new Joint Omega Executive provides both independent and collaborative insight of systems-of-systems operations in the field to support capability increments.

THE RIGHT OVERSIGHT

The Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, through either the Director for Systems and Software Engineering, or the new Director for Developmental T&E (Weapons, 2009) oversee Alpha activities, ensuring that adequate insight and progress support (along with user representatives) are provided once capabilities are fielded. This lead would also ensure sufficient capacity, training, and capability exist at T&E facilities. The DOT&E would oversee all Omega testing, advise on operational realism for Alpha events, and continue to report independently to Congress. Oversight agents will focus less on technical detail, but rather on validating that achieved capability is usable and understood by the users.

A NEW TEMP

The department has built an entire cottage industry around the Test and Evaluation Master Plan (TEMP), whose value is to document the T&E commitment between program manager and the OTA. Yet, in the pace of today's programmatic change, the TEMP becomes rapidly outdated. Under this process, the TEMP would not focus on a program's 10-year T&E plan, but rather outline the top-level strategy of a shorter period leading to the next ASU decision, focusing on system maturity, external resources, and likely data collection points.

Conclusions

The recently revised DoD 5000 strengthens the primacy of fielding, through acquisition, with T&E primarily supporting the latter. This article proposed a new map for Acquisition T&E, supporting today's persistent engagement as well as the next near-peer threat. The DoD cannot wait for optimal solutions before fielding capabilities or rely solely on T&E as its gatekeeper. This new Alpha-Omega strategy, based on acceptance testing for delivery and operational use evaluations in the field, is on par with acquisition as it exists today, not on how we wish it to be. This strategy recognizes and accepts T&E's core role in engineering and contract compliance, as well as T&E's ultimate customer—the warfighter.

This article examined how the acquisition environment has changed and how the process itself has evolved as it continues to adapt to this new reality. Nevertheless, recent authoritative studies on T&E have not recognized these fundamental changes in the landscape and have only recommended modest changes to T&E processes to speed them up a bit and make them cost a little less. T&E must emerge from its relegated place in the shadows of acquisition to support a new customer set. The Alpha-Omega strategy offers the hope of changing this by shifting the traditional OTA role out of the “buy” process into the more relevant fielding process as the agent of choice for a much wider set of customers, including not only Service acquisition and life-cycle agents, but also component commanders, trainers and doctrine agents, and requirements developers.

The Alpha-Omega Strategy for T&E supports bringing capability to the field faster, with better understanding of capabilities and limitations, across a broader set of systems-of-systems than current methodologies—streamlined or not—can ever do. The time is right for fundamental change.

Author Biography

Mr. George M. Axiotis currently leads the Integrated Resources Analysis Team for the Director, Operational Test and Evaluation, Office of the Secretary of Defense (OSD), providing congressionally mandated assessments of T&E resources used for Department of Defense (DoD) testing, as well as oversight of Service test resources investments. Mr. Axiotis, a recent graduate of the Industrial College of the Armed Forces, has over 26 years in defense acquisition and test and evaluation (T&E), having served as a project and test manager on four DoD Acquisition Category programs; a program sponsor; and a T&E advisor to two program executive offices. Before joining OSD, Mr. Axiotis was director of the Naval Sea Systems Command Test and Evaluation Office.

(E-mail address: George.axiotis@osd.mil)

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